



# STIC Search Report

## EIC 2800

STIC Database Tracking Number: 157108

TO: Charles Garber  
Location: JEF 8D31  
Art Unit : 2856  
Friday, June 24, 2005

Case Serial Number: 10716248

From: Michael Obinna  
Location: EIC 2800  
JEF4B68  
Phone: 272-2663

michael.obinna@uspto.gov

### Search Notes

RE: Subsea Vehicle Assisted Pipeline Commissioning Method

Examiner Garber,

Attached are edited search results from the patent and non-patent databases.

The tagged items are some of the results worth your review.

I recommend that you browse all the results.

If you would like more searching on this case, or if you have questions or comments, please let me know.

Respectfully,

Michael Obinna





# STIC Search Results Feedback Form

## EIC 2800

Questions about the scope or the results of the search? Contact *the EIC searcher or contact:*

Jeff Harrison, EIC 2800 Team Leader  
571-272-2511, JEF 4B68

## Voluntary Results Feedback Form

➤ I am an examiner in Workgroup:  Example: 2810

➤ Relevant prior art **found**, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature  
(journal articles, conference proceedings, new product announcements etc.)

➤ Relevant prior art **not found**:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC2800, GP4-9C18



# SEARCH REQUEST FORM Scientific and Technical Information Center - EIC2800

Rev. 3/15/2004 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, JEF-4B68, 272-2511.

Date 6/16/05 Serial # 10/716,248 Priority Application Date 6/26/01  
Your Name Charles Garber Examiner # 77801  
AU 2856 Phone 571 272 2194 Room JEF 8031  
In what format would you like your results? Paper is the default. ☒ PAPER ☐ DISK ☐ EMAIL

If submitting more than one search, please prioritize in order of need.

The EIC searcher normally will contact you before beginning a prior art search. If you would like to sit with a searcher for an interactive search, please notify one of the searchers.

Where have you searched so far on this case?

Circle: ☒ USPT ☒ DWPI ☒ EPO Abs ☒ IPO Abs ☐ IBM TDB

Other: Internet

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements.

What types of references would you like? Please checkmark:

Primary Refs ☒ Nonpatent Literature ☒ Other \_\_\_\_\_  
Secondary Refs ☒ Foreign Patents ☒ \_\_\_\_\_  
Teaching Refs ☐ \_\_\_\_\_

What is the topic, such as the novelty, motivation, utility, or other specific facets defining the desired focus of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

using a vehicle (underwater) To operate a  
pump To raise the internal pressure in  
an underwater pipeline sufficiently for  
hydrostatic testing  
(see claims 1, 4, 6-9)

alternatives for underwater - under sea, sea floor  
sea bottom, submerged,  
submersible, ocean floor, ocean bottom  
sub sea

## Staff Use Only

Searcher: Michael Oberer

Searcher Phone: 571-272-2663

Searcher Location: STIC-EIC2800, JEF-4B68

Date Searcher Picked Up: 6/20/04

Date Completed: 6/24/04

Searcher Prep/Rev Time: 1270

Online Time: 560

## Type of Search

Structure (#) \_\_\_\_\_

Bibliographic ☒

Litigation \_\_\_\_\_

Fulltext ☒

Patent Family \_\_\_\_\_

Other \_\_\_\_\_

## Vendors

STN ☒

Dialog ☒

Questel/Orbit \_\_\_\_\_

Lexis-Nexis \_\_\_\_\_

WWW/Internet \_\_\_\_\_

Other East Foreign

10/716248

23jun05 15:29:38 User276834 Session D65.3

SYSTEM:OS - DIALOG OneSearch

File 348:EUROPEAN PATENTS 1978-2005/Jun W02

File 349:PCT FULLTEXT 1979-2005/UB=20050616,UT=20050609

10/716248

Set	Items	Description
S1	80736	UNDERWATER? OR UNDER(2N)WATER? OR UNDERSEA? OR SEAFLOOR? OR SEA(2N)FLOOR? OR SEA(2N)BOTTOM??? OR SUBMERG???? OR SUBMERSIBL??? OR OCEANFLOOR?? OR OCEAN(2N)FLOOR?? OR OCEAN(2N)BOTTOM??? OR SUBSEA OR SUB()SEA OR SEABED OR SEA(2N)BED OR MARINE
S2	1182067	CLEAN???? OR DEWATER???? OR DRY???? OR PIG???? OR INSPECT??? OR MAINT??????? OR EXPURGAT??? OR PURG???? OR PURIF???????
S3	38729	HYDRO(2N)TEST???? OR HYDROTEST???? OR HYDROSTATIC OR HYDRO(2N)STATIC? OR WATERTEST??? OR WATER(2N)TEST???? OR LEAK????(3N)RESIST???? OR PRESSURE(3N) LEAK???? OR PRESSURE(3N)FLAW??
S4	1506274	PIPELIN???? OR PIPE(3N)LINE OR PIPE? ? OR VESSEL? ? OR AQUEDUCT? ? OR CANAL??? OR CHANNEL???? OR CONDUIT OR FLUID(3N)PASSAG???? OR MAIN? ? OR DUCT? ? OR TUBE? ? OR PASSAG??? OR LINE? ? OR CHAMBER?? OR MANIFOLD??? OR PLATFORM??? OR OFFSHORE(2N)(TREES OR FACILITY)
S5	120177	PIG???? OR PIPELINE()INSPECT????() (GAUG???? OR GADGET??)
S6	254854	PUMP???? OR SIPHON????
S7	29399	SV? ? OR SUBSEA(2N)VEHICLE? ? OR ROV? ? OR REMOTE??()OPERAT???()VEHICLE? ? OR AUV? ? OR AUTONOMOUS()UNDERWATER()VEHICLE??
S8	14576	(ROBOT?? OR MACHINE OR AI OR INTELLIGEN???? OR AUTOMATON OR COMPUTER???? OR MECHANIC???) (3N) (ARM? ? OR LEVER??? OR LIMB?? OR APPENDAGE? ?)
S9	49162	(INTERNAL??? OR INNER OR CORE) (3N) (PRESSUR???? OR STRAIN???? OR STRESS??? OR TENSION???)
S10	34	HYDROSTATIC????(5N)PIPELINE
S11	60	SUBMERG????(3N)PIPELINE
S12	673820	(SECOND OR TWO OR BOTH OR TWIN OR 2 OR EACH OR 2ND OR DOUBLE) (3N) (END??? OR POINT??? OR EDGE??? OR INLET? ? OR OUTLET? ? OR MANIFOLD? ?)
S13	73352	(RAIS???? OR INCREASE???? OR MAXIMIZ????) (3N) (PRESSURE)
S14	333	PIG(3N) (LAUNCH???? OR RECEIV???? )
S15	1958	IC=(G01M-003/04 OR B63B-035/03 OR F16L-001/16 OR F16L-055/48 OR G01M-003/18 OR G01M-019/00 OR G01M-003/08 OR B08B-001/00 OR F16L-001/04 OR F16L-045/00 OR F16L-055/00 OR G01C007/06 OR B08B-009/00 OR B08B-009/04 OR G01H-003/00)
S16	0	MC=(S02-J06A OR S02-J06B OR S02-J06)
S17	1	S1 AND S2 AND S3 AND S4 AND S5 AND S6 AND S7 AND S8 AND S9AND S12 AND S13
S18	475	S1(3N)S3
S19	0	S18(3N)S7
S20	5	S18(3N)S12
S21	3	S18(3N)S13
S22	0	S10 AND S11 AND S13
S23	478	S1(3N)S12
S24	478	IDPAT (sorted in duplicate/non-duplicate order)
S25	443	IDPAT (primary/non-duplicate records only)
S26	329	S25 AND PY<=2001
S27	5	S26 AND S15
S28	27	S26 AND S3
S29	267	S26 AND S2
S30	8	S26(3N)S2
S31	24	S29 AND S7
S32	5	S20 NOT S17
S33	3	S21 NOT (S17 NOT S20)
S34	5	S27 NOT (S17 OR S20 OR S21)
S35	26	S28 NOT (S17 NOT S20 OR S21 OR S27)
S36	7	S30 NOT (S17 NOT S20 OR S21 OR S27 OR S28)
S37	5	S31 NOT (S17 NOT S20 OR S21 OR S27 OR S28 OR 30)

31/TI,AB,AD,AN,PD,PN,K/18 (Item 9 from file: 349)  
DIALOG(R)File 349:(c) 2005 WIPO/Univentio. All rts. reserv.

**FLOATING SPAR FOR SUPPORTING PRODUCTION RISERS**

**RONDIN FLOTTANT DE SUPPORT DE COLONNES MONTANTES DE PRODUCTION**

Patent and Priority Information (Country, Number, Date):

Patent: WO 200003112 A1 20000120 (WO 0003112)  
Application: WO 99US15423 19990709 (PCT/WO US9915423)

**English Abstract**

A subsea production system is provided for producing a number of subsea wells which may be arranged in groups. Each of the groups of subsea wellheads (36) is connected to deliver production flow to a **subsea manifold** (40, 42, 46) **each** connected to deliver production flow to a production riser (28). A plurality of risers (28) extend from the subsea manifolds for groups of wells. A deep draft floating spar (10) is located above the wellheads (36) with mooring lines (14) and has a production platform (12) located above the sea surface (11) and has buoyancy and ballast chambers (18) to control floatation. The spar structure defines a riser bore (22) receiving the risers extending from the subsea wellheads (36) to the platform (12). The spar is also capable of being shifted laterally by mooring lines for positioning above a selected well to thus permit well intervention activities as needed. The subsea wells are each provided with wellheads having a removable cap (40) to permit ROV (54) actuated cap removal and replacement.

**French Abstract**

L'invention concerne un systeme de production sous-marine permettant de produire plusieurs puits sous-marins pouvant etre groupes. Chaque groupe de tetes de puits (36) sous-marines est relie de maniere a fournir un flux de production a un collecteur (40, 42, 46) sous-marin, chaque collecteur sous-marin etant relie de maniere a fournir un flux de production a une colonne montante (28) de production. Plusieurs colonnes montantes (28) s'etendent a partir des collecteurs sous-marins vers les groupes de puits. Un rondin flottant (10) a fort tirant est dispose au-dessus des tetes de puits (36) avec des lignes d'amarre (14) et comprend une plate-forme de production (12) situee au-dessus de la surface de la mer (11) ainsi que des chambres (18) de flottaison et de ballast destinees a reguler la flottaison. La structure de rondin definit un trou (22) de colonne montante logeant les colonnes montantes s'etendant a partir des tetes de puits (36) sous-marines vers la plate-forme. On peut egalement deplacer lateralement le rondin au moyen de lignes d'amarre afin de le placer au-dessus d'un puits selectionne, ce qui permet d'effectuer des interventions dans le puits si necessaire. Les puits sous-marins comprennent chacun des tetes de puits dotees de couvercles (40) amovibles pour permettre un retrait et un remplacement du couvercle au moyen d'un vehicule actionne a distance (54).

Patent and Priority Information (Country, Number, Date):

Patent: ... 20000120

Fulltext Availability:

Detailed Description  
Claims

**English Abstract**

...of the groups of subsea wellheads (36) is connected to deliver production flow to a **subsea manifold** (40, 42, 46) **each** connected to deliver production flow to a production riser (28). A plurality of risers (28...

...The subsea wells are each provided with wellheads having a removable cap (40) to permit ROV (54) actuated cap removal and replacement.

Publication Year: 2000

#### Detailed Description

... Since a production spar is a floating vessel, each riser must be vertically tensioned to maintain its structural integrity. Hydraulic piston assemblies, electro-mechanical devices, and dashpots are some of the mechanisms used to maintain a constant tension while the spar is heaving or moving laterally (due to the ocean...)

...trees and manifolds through the spar to the production platform for flow control, test or maintenance work. The production risers from the subsea tree and manifolds may be flexible cables or...may utilize a light weight tree cap which may be deployed and recovered by a remotely operated vehicle ( ROV ).

Utilizing subsea technology, the costs of deepwater spars are reduced by reducing the number of risers between...

...the individual well riser, requiring bigger buoyancy to support its weight.

Other risers for pipeline pigging , well testing, and control (electrical/hydraulic line) cables to operate the subsea wells may also ...

...Small intervention well control hardware can be run and suspended from the spar for periodic maintenance and workovers. Another object of the invention is the provision of such a spar subsea...

...connected to a subsea wellhead and having a removable tree cap for removal by a remotely operated vehicle ( ROV ) to permit access to the subsea tree and subsea wellhead such as may be required...first positioned vertically over the subsea tree 38 as shown in Figure 2. A remotely operated vehicle ( ROV ) illustrated generally at 54 is normally utilized with the intervention riser system. Subsea tree cap 40 is first removed utilizing the ROV . An 1 5 intervention system (not shown) is landed and locked onto the top of tree 38. The tree cap 40 is normally provided with a space for positioning of ROV 54 over cap 40 in an aligned position for removal of cap 40 and landing...

...the intervention system onto tree 38. After the completion of the workover or other operation, ROV 54 picks up and reinstalls tree cap 40 and tests the connection to insure pressure...

...spar 10, the entire disclosure of patent no. 5,706,897 is incorporated by reference. ROV 54 may be controlled from platform 12 or a separate dive support vessel.

While three...  
...be utilized.

In the present invention, a floating spar production system utilizes subsea trees having ROV removable tree caps and connected by risers to subsea manifolds which, in turn, have production...

#### Claim

... after completion of said well intervention operations.

3 The method of claim 2, wherein a **remote operated vehicle ( ROV )** is provided for removal and replacement of removable wellhead caps, said method comprising:  
(a) actuating said **ROV** for removal of said removable wellhead cap from the selected wellhead; and  
(b) after completing said well intervention operation, actuating said **ROV** for replacing said removable wellhead cap to permit resumption of well production.

4 The method...

...manifold connected to receive production flow from each of the wellheads of said group and **each** of said **subsea manifolds** of said groups having a production riser extending through said riser bore, said method comprising...

...system of claim 6, comprising:

(a) said subsea wells being arranged in groups;  
(b) said **subsea production manifolds each** being connected to receive production flow from the wellheads of one of said groups of...

...to permit well intervention activities; and

(b) said removable cap being removable and replaceable by **ROV** controlled servicing activities.

9 The subsea production system of claim 7, comprising:

(a) said plurality...stationing thereof above a selected wellhead intended for intervention;  
I I (d) a plurality of **subsea production manifolds each** being connected to receive production from a group of said plurality of wellheads; and  
(e...

...system of claim 13, comprising:

(a) said subsea wellheads being arranged in groups;  
(b) said **subsea production manifolds each** being connected to receive production flow from the wellheads of one of said groups of...

...to permit well intervention activities; and

(b) said removable cap being removable and replaceable by **ROV** controlled servicing activities.

16 The subsea production system of claim 13, comprising:

(a) said plurality...

23jun05 11:49:25 User276834 Session D63.1

SYSTEM:OS - DIALOG OneSearch

File 2:INSPEC 1969-2005/Jun W2  
File 6:NTIS 1964-2005/Jun W2  
File 8:EI Compendex(R) 1970-2005/Jun W2  
File 34:SciSearch(R) Cited Ref Sci 1990-2005/Jun W3  
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
File 35:Dissertation Abs Online 1861-2005/May  
File 65:Inside Conferences 1993-2005/Jun W3  
File 94:JICST-EPlus 1985-2005/May W1  
File 99:Wilson Appl. Sci & Tech Abs 1983-2005/May  
File 144:Pascal 1973-2005/Jun W2  
File 305:Analytical Abstracts 1980-2005/Jun W2  
File 344:Chinese Patents Abs Aug 1985-2005/May  
File 347:JAPIO Nov 1976-2005/Feb(Updated 050606)  
File 350:Derwent WPIX 1963-2005/UD,UM &UP=200539  
File 371:French Patents 1961-2002/BOPI 200209  
File 118:ICONDA-Intl Construction 1976-2005/May  
File 331:Derwent WPI First View UD=200539  
File 103:Energy SciTec 1974-2005/Jun B1  
File 245:WATERNET(TM) 1971-2004Q3

10/716248

Set	Items	Description
S1	1036736	UNDERWATER? OR UNDER(2N)WATER? OR UNDERSEA? OR SEAFLOOR?SEA(2N)FLOOR? OR SEA(2N)BOTTOM??? OR SUBMERG???? OR SUBMERSIBL??? OR OCEANFLOOR?? OR OCEAN(2N)FLOOR?? OR OCEAN(2N)BOTTOM???OR SUBSEA OR SUB()SEA OR SEABED OR SEA(2N)BED OR MARINE
S2	6769122	CLEAN???? OR DEWATER???? OR DRY???? OR PIG???? OR INSPECT??? OR MAINT??????? OR EXPURGAT??? OR PURG???? OR PURIF???????
S3	186463	HYDRO(2N)TEST???? OR HYDROTEST???? OR HYDROSTATIC OR HYDRO(2N)STATIC? OR WATERTEST??? OR WATER(2N)TEST???? OR LEAK????(3N)RESIST???? OR PRESSURE(3N) LEAK???? OR PRESSURE(3N)FLAW??
S4	13862220	PIPELIN???? OR PIPE(3N)LINE OR PIPE? ? OR VESSEL? ? OR AQUEDUCT? ? OR CANAL??? OR CHANNEL???? OR CONDUIT OR FLUID(3N)PASSAG???? OR MAIN? ? OR DUCT? ? OR TUBE? ? OR PASSAG??? OR LINE? ? OR CHAMBER?? OR MANIFOLD??? OR PLATFORM??? OR OFFSHORE(2N)(TREES OR FACILITY)
S5	686627	PIG???? OR PIPELINE()INSPECT????() (GAUG???? OR GADGET??)
S6	1189914	PUMP???? OR SIPHON????
S7	84842	SV? ? OR SUBSEA(2N)VEHICLE? ? OR ROV? ? OR REMOTE??()OPERAT???()VEHICLE? ? OR AUV? ? OR AUTONOMOUS()UNDERWATER()VEHICLE? ?
S8	53309	(ROBOT?? OR MACHINE OR AI OR INTELLIGEN???? OR AUTOMATON OR COMPUTER???? OR MECHANIC???) (3N) (ARM? ? OR LEVER??? OR LIMB? ? OR APPENDAGE? ?)
S9	199491	(INTERNAL??? OR INNER OR CORE) (3N) (PRESSUR???? OR STRAIN???? OR STRESS??? OR TENSION???)
S10	210	HYDROSTATIC????(5N)PIPELINE
S11	270	SUBMERG????(3N)PIPELINE
S12	1417436	(SECOND OR TWO OR BOTH OR TWIN OR 2 OR EACH OR 2ND OR DOUBLE) (3N) (END??? OR POINT??? OR EDGE??? OR INLET? ? OR OUTLET? ? OR MANIFOLD? ?)
S13	175843	(RAIS???? OR INCREASE???? OR MAXIMIZ????) (3N) (PRESSURE)
S14	665	PIG(3N) (LAUNCH???? OR RECEIV????)
S15	0	IC=(G01M-003/04 OR B63B-035/03 OR F16L-001/16 OR F16L-055/48 OR G01M-003/18 OR G01M-019/00 OR G01M-003/08 OR B08B-001/00 OR F16L-001/04 OR F16L-045/00 OR F16L-055/00 OR G01C-007/06 OR B08B-009/00 OR B08B-009/04 OR G01H-003/00)
S16	8096	MC=(S02-J06A OR S02-J06B OR S02-J06)
S17	18	S1 AND S2 AND S3 AND S4 AND S7
S18	2	S17 AND S10
S19	0	S17 AND S8
S20	1	S17 AND S9
S21	0	S10 AND S11 AND S12
S22	103619	S1 AND S2
S23	1274	S22 AND S3
S24	518	S23 AND S4
S25	12	S24(3N)S12
S26	0	S1 AND S3 AND S7 AND S12 AND S13
S27	5	S1 AND S3 AND S7 AND S12
S28	28	S24 AND S13
S29	6	S23 AND S16
S30	47	S22 AND S16
S31	0	S18 NOT S17
S32	0	S20 NOT (S17 OR S18)
S33	11	S25 NOT (S17 OR S18 OR S20)
S34	4	S27 NOT (S17 OR S18 OR S20 OR S25)
S35	25	S28 NOT (S17 OR S18 OR S20 OR S25 OR 27)
S36	4	S29 NOT (S17 OR S18 OR S20 OR S25 OR 27 OR 28)
S37	27	S28 NOT (S17 OR S18 OR S20 OR S25 OR S27)
S38	3	S29 NOT (S17 OR S18 OR S20 OR S25 OR S27 OR S28)
S39	41	S30 NOT (S17 OR S18 OR S20 OR S25 OR S27 OR S28 OR S29)
S40	527	S1(3N)S12
S41	1	S40(3N)S3
S42	11	S40 AND S3
S43	7	S42 NOT (S17 OR S18 OR S20 OR S25 OR S27 OR S28 OR S29 OR S30)

17/9/6 (Item 1 from file: 8)  
 DIALOG(R) File 8: Ei Compendex(R)  
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07437411 E.I. No: EIP05239142706

**Title: Deepwater developments**

Author: Graves, Les

Source: Petroleum Review v 59 n 700 May 2005.

Publication Year: 2005

CODEN: PETRB2 ISSN: 0020-3076

Language: English

Document Type: JA; (Journal Article) Treatment: G; (General Review)

Journal Announcement: 0506W3

Abstract: The advantages of **subsea** remote flooding module (RFM) developed by Norson to flood and **pig pipelines** and flowlines in water depths of almost 1,000 meter to **clean** and allow pressure testing are discussed. The module uses the available seawater pressure outside the **pipe** as a source of power and water to flood and **pig the lines**. The modular remote system is **ROV** friendly and removes the need for connection to a topsides **vessel** and helps in saving substantial costs and time. The RFM uses rigid loading arm technology to reduce **subsea** connection times and also reduced thermal stabilization for **hydrotest**.  
 (Edited abstract)

DATE ???

Descriptors: \*Offshore **pipelines**; Atmospheric pressure; Oil well flooding; Filtration; Project management; Hydraulics; Costs; Risk assessment; Centrifugal pumps

Identifiers: Norson (CO); **Subsea pipelines**; Remote flooding module (RFM); Thermal stabilization

Classification Codes:

511.2 (Oil Field Equipment); 619.1 (Pipe, Piping & Pipelines); 443.1 (Atmospheric Properties); 511.1 (Oil Field Production Operations); 802.3 (Chemical Operations); 912.2 (Management); 632.1 (Hydraulics); 914.1 (Accidents & Accident Prevention); 618.2 (Pumps)

511 (Oil Field Equipment & Production Operations); 619 (Pipes, Tanks & Accessories; Plant Engineering Generally); 443 (Meteorology); 802 (Chemical Apparatus & Plants; Unit Operations; Unit Processes); 912 (Industrial Engineering & Management); 632 (Hydraulics, Pneumatics & Related Equipment); 911 (Cost & Value Engineering; Industrial Economics); 914 (Safety Engineering); 618 (Compressors & Pumps)

51 (PETROLEUM ENGINEERING); 61 (MECHANICAL ENGINEERING, PLANT & POWER); 44 (WATER & WATERWORKS ENGINEERING); 80 (CHEMICAL ENGINEERING, GENERAL); 91 (ENGINEERING MANAGEMENT); 63 (FLUID FLOW; HYDRAULICS, PNEUMATICS & VACUUM)

17/9/7 (Item 2 from file: 8)  
 DIALOG(R)File 8:Ei Compendex(R)  
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07359225 E.I. No: EIP05179056027

**Title:** Subsea **deepwater flushing/** pigging / hydrotesting **system**

**Author:** Anon

**Source:** World Oil v 226 n 4 April 2005.

**Publication Year:** 2005

**CODEN:** WOUIAS **ISSN:** 0043-8790

**Language:** English

**Document Type:** JA; (Journal Article) **Treatment:** T; (Theoretical)

**Journal Announcement:** 0504W0

**Abstract:** The features of SAPPS, an intervention tool developed by Cybernetix for **subsea** precommissioning of **pipelines** in water depths up to 2,500m, are discussed. The system is designed as a tool skid that can be fitted underneath any work class **remotely operated vehicles** (ROV <sup>DATE??</sup>). The system filters seawater at ambient pressure and feeds it into the air-filled **pipeline**, thereby flooding the **line** and pushing the **pig** forward. For the free flooding phase, the system uses seawater **hydrostatic** pressure to fill the **pipeline** with water, while for flooding completion, although free flooding allows seawater filling over most of the **pipe**'s length, external energy has to be supplied to complete the operation. (Edited abstract)

**Descriptors:** \*Offshore **pipelines**; Testing; **Remotely operated vehicles**; Flow control; Valves (mechanical); Filters (for fluids); Oil well flooding; Injection (oil wells); Corrosion inhibitors

**Identifiers:** **Hydrotesting** systems; Cybernetix (CO); Precommissioning; Flow meters

**Classification Codes:**

539.2.1 (Protection Methods)

511.2 (Oil Field Equipment); 619.1 (Pipe, Piping & Pipelines); 731.5 (Robotics); 631.1 (Fluid Flow, General); 731.3 (Specific Variables Control); 601.2 (Machine Components); 445.1 (Water Treatment Techniques); 511.1 (Oil Field Production Operations); 539.2 (Corrosion Protection)

511 (Oil Field Equipment & Production Operations); 619 (Pipes, Tanks & Accessories; Plant Engineering Generally); 731 (Automatic Control Principles & Applications); 631 (Fluid Flow); 601 (Mechanical Design); 445 (Water Treatment); 539 (Metals Corrosion & Protection; Metal Plating)

51 (PETROLEUM ENGINEERING); 61 (MECHANICAL ENGINEERING, PLANT & POWER); 73 (CONTROL ENGINEERING); 63 (FLUID FLOW; HYDRAULICS, PNEUMATICS & VACUUM); 60 (MECHANICAL ENGINEERING, GENERAL); 44 (WATER & WATERWORKS ENGINEERING); 53 (METALLURGICAL ENGINEERING, GENERAL)

17/9/11 (Item 6 from file: 8)  
 DIALOG(R) File 8: Ei Compendex(R)  
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06309316 E.I. No: EIP03097376731

Title: **Acoustic leak detection for underwater oil and gas pipelines**

Author: Barbagelata, Alessandro; Barbagelata, Luigi

Corporate Source: Co.L.Mar, La Spezia, Italy

Source: Sea Technology v 43 n 11 November 2002. p 39-44

Publication Year: 2002

ISSN: 0093-3651

Language: English

Document Type: JA; (Journal Article) Treatment: T; (Theoretical)

Journal Announcement: 0303W2

Abstract: In the offshore industry, once a new oil or gas **pipeline** is completed it has to go through a check known as a "**hydro - test**" prior to commissioning. The **pipeline** is sealed and filled with seawater, and the internal pressure is raised up to a test value and then subsequently monitored. If pressure is observed to be decreasing, it indicates that the **pipeline** has a leak somewhere along its length. This can prove incredibly costly for the **pipeline** construction company, and, in general, clients will not accept **pipelines** until a **hydro - test** has been successfully completed. If **hydro - testing** determines that leaks are present, it is then important to locate the leaks as soon as possible in order to start repairs. Problems arise when trying to locate holes that can be only a few millimetres in diameter somewhere along possibly hundreds of kilometres of **pipeline**. This is particularly difficult if, as is often the case, the **pipeline** is either partially or totally buried in sediment. Work of this nature may take a long time, and time is expensive- especially if one has barges, **vessels** and personnel offshore. Traditional techniques for leak **inspection** consist of filling the **pipeline** with a solution of water and a chemically or optically detectable compound. The **pipeline** is then followed by an **ROV** equipped with either a dedicated sensor or a video camera, as appropriate. During numerous offshore surveys (in which our equipment was often used in parallel with these conventional techniques), we observed a number of limitations with traditional leak detection systems. The efficiency of these systems is a function of the concentration of the detectable component in the seawater in the area of a leak. Even in the case of a large leak, this concentration can be dramatically reduced by ambient conditions such as current flow, **pipeline** burial or water visibility. Furthermore, in the case of very small leaks, the flow rate is often too low to reach the threshold concentration of the systems, even when used in suitable ambient conditions. Several years ago, Co.L.Mar. was requested by a major oil company to research an alternative solution for **underwater pipeline** leak detection. In order to avoid the limits of the optical and chemical systems, an acoustic solution was investigated. Acoustic propagation is not dependent on current or turbidity, and the acoustic signal generated by a leak can be very strong, even if the source is a leak of relatively small dimensions. Acoustic signals generated by **pipeline** leaks are detected by a system comprised of a hydrophone array, a preamplifier and a cable driver. The **underwater** unit may be used in a variety of ways, such as on a **vessel**-towed fish, an **ROV** installation or in handheld mode by a diver. This last method of operation is particularly suited to **inspection** around flanges, valves, etc. The signal is brought onboard via cable where it is initially preconditioned prior to acquisition by a PC. Data is immediately processed, displayed and digitally recorded. The software visualises in various ways the results of the analysis of the signal along the track, allowing evaluation in real time of the evolution of the acoustic content and, therefore, the rising of components related to the leakage presence.

DATE??

17/9/18 (Item 2 from file: 103)

DIALOG(R)File 103:Energy SciTec

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02255016 NOV-88-030132; EDB-89-000745

**Title:** Underwater **testing of Oseberg** ROV tooling

**Author(s):** Jolly, R.D.; Hughes, E.W.

**Affiliation:** Ocean Systems Engineering Inc. (US)

**Title:** **Proceedings of the twentieth annual offshore technology conference.**

**Volume 2**

**Conference Title:** Offshore technology conference

**Conference Location:** Houston, TX, USA **Conference Date:** 2 May 1988

**Publisher:** Offshore Technology Conference, Richardson, TX

**Publication Date:** 1988

p 401-406

**Report Number(s):** CONF-880597-

**Note:** Technical Paper OTC 5727

**Document Type:** Analytic of a Book; Conference literature

**Language:** English

**Journal Announcement:** ETD8970

**Subfile:** ETD (Energy Technology Data Exchange). NOV (DOE contractor)

**Country of Origin:** United States

**Country of Publication:** United States

**Abstract:** This paper discusses the preliminary **underwater** testing of the ROV tooling and work packages developed for Norsk Hydro's Oseberg field. Final shallow **water** integration **testing** using the actual **subsea** equipment was originally scheduled to take place in Dec. '87 or Jan. '88 but was delayed. Since all of the ROV tooling and interface work was complete at that time, it was decided to construct an **underwater** test fixture and carry out separate **underwater** testing of these items to prove their performance in an actual operational situation. This was done to ensure that the solution of any problems found during testing could be easily accomplished prior to mobilizing the equipment for the offshore installation phase. The tests were carried out at Oceaneering's facility in Stavanger, Norway in Nov. '87. This paper discusses these tests, their results and the conclusions reached about the tooling designs. In addition, a brief review of the ROV tasks, **subsea** equipment design, and intervention work package designs is given at the beginning of the paper to provide needed continuity to the test discussion.

**Major Descriptors:** \*OFFSHORE **PLATFORMS** -- INSTALLATION; \*SUBMARINES -- TESTING

**Descriptors:** DESIGN; EVALUATION; **MAINTENANCE** ; NATURAL GAS WELLS; NORTH SEA; NORWAY; OIL WELLS; REMOTE CONTROL; TOOLS; **UNDERWATER** OPERATIONS

**Broader Terms:** ATLANTIC OCEAN; CONTROL; EUROPE; SCANDINAVIA; SEAS; SHIPS; SURFACE WATERS; WELLS; WESTERN EUROPE

**Subject Categories:** 020300\* -- Petroleum -- Drilling & Production

030300 -- Natural Gas -- Drilling, Production, & Processing

420206 -- Engineering -- Mining & Drilling Equipment & Facilities -- (1980-1989)

423000 -- Engineering -- Marine Engineering -- (1980-)

34/9/1 (Item 1 from file: 8)  
 DIALOG(R) File 8: Ei Compendex(R)  
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05024937 E.I. No: EIP98054222388

Title: **Mensa Project: Flowlines**

Author: Gilchrist, R.T.; Kluwen, F.A.

Corporate Source: Shell Deepwater Development Systems, Inc

Conference Title: Proceedings of the 1998 30th Offshore Technology Conference, OTC, Part 4 (of 4)

Conference Location: Houston, TX, USA Conference Date: 19980504-19980507

E.I. Conference No.: 48424

Source: Field Drilling and Development Systems Offshore Technology Conference, Annual Proceedings v 4 1998. Offshore Technol Conf, Richardson, TX, USA. p 191-201 OTC 8628

Publication Year: 1998

CODEN: OSTCBA ISSN: 0160-3663

Language: English

Document Type: CA; (Conference Article) Treatment: G; (General Review)

Journal Announcement: 9807W4

Abstract: This paper describes engineering designs, installation particulars and learning points from development of the Mensa pipeline transportation system. The information presented will be of interest to engineers involved in design, construction or repair of offshore pipelines and **subsea** flowlines. The Mensa 12 inches multiplied by 63 miles interfield flowline was S-laid to a depth of 5300 feet. The **second end** was terminated at depth using a Pipeline End Manifold (PLEM). The PLEM was fitted with vertical connection hubs and a horizontal jumper was installed between the PLEM and the Mensa manifold. The flowline maximum allowable operating pressure (MAOP) varies with location and has been calculated considering maximum possible flow rates, pressure relief facilities and **hydrostatic** pressures. Damage during construction was repaired using shaped-charge cutting devices, ROV-operated lift frames, ROV-operated pipe recovery tools and ROV-operated pipe repair tools at 5000 feet. Seven miles of pipe from depths between 5300 feet and 4700 feet was recovered up the stinger by 'reverse lay' and later reinstalled. Three 6 inches multiplied by 5-mile long intrafield flowlines were initiated using stab and hinge tools and terminated with vertical hub PLEMs adjacent to **subsea** wells. The stab & hinge tools were deployed down an S-lay vessel stinger. The PLEMs were welded to the flowlines on the surface and the entire assembly was lowered into place. During raising/lowering sequences of pipe ends, with and without PLEMs, rotations in excess of 500 degree were observed. End cuts were made using a long baseline acoustic positioning system for reference. These repeatedly yielded actual positions within one meter of target. Each intrafield line was fitted with 15 lift frames at 500 ft intervals starting at the **subsea** wells. These were placed using a coordinated procedure involving lowering by cable and near-bottom ROV guidance. The purpose of these frames is to lift the pipe into the seaway to facilitate cooling of the produced gas. (Author abstract)

Descriptors: \*Offshore pipelines; Pressure effects; **Submersibles**; Computational methods; Hinges

Identifiers: **Remote operated vehicles (ROV)**; Pipeline end manifolds (PLEM)

Classification Codes:

511.2 (Oil Field Equipment); 619.1 (Pipe, Piping & Pipelines); 674.1 (Small Marine Craft)

511 (Oil Field Equipment & Production Operations); 619 (Pipes, Tanks & Accessories); 674 (Other Marine Craft); 921 (Applied Mathematics); 605

37/9/15 (Item 2 from file: 350)  
 DIALOG(R)File 350:Derwent WPIX  
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015420615 \*\*Image available\*\*  
 WPI Acc No: 2003-482755/200345  
 XRAM Acc No: C03-129216  
 XRPX Acc No: N03-383892

**Controlling of pressures during subsea well drilling operations in earth formation, comprises pumping drilling fluid in formation to provide hydrostatic pressure, which is maintained between fracture re-open and propagation pressure**

Patent Assignee: SHELL OIL CO (SHEL ); SHELL INT RES MIJ BV (SHEL );  
 KOTARA E B (KOTA-I); MAYO G H (MAYO-I); VAN OORT E (VOOR-I); VON  
 EBERSTEIN W H (VEBE-I); WEAVER M A (WEAV-I)

Inventor: KOTARA E B; MAYO G H; VAN OORT E; VON EBERSTEIN W H; WEAVER M A;  
 NAYO G H; VAN CORT E; OORT E

Number of Countries: 102 Number of Patents: 007

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200348525	A1	20030612	WO 2002US38509	A	20021203	200345 B
US 20030127230	A1	20030710	US 2001337009	P	20011203	200347
			US 2002308516	A	20021203	
AU 2002353012	A1	20030617	AU 2002353012	A	20021203	200419
BR 200214600	A	20040914	BR 200214600	A	20021203	200469
			WO 2002US38509	A	20021203	
GB 2400871	A	20041027	WO 2002US38509	A	20021203	200470
			GB 200412269	A	20040602	
US 6823950	B2	20041130	US 2001337009	P	20011203	200479
			US 2002308516	A	20021203	
NO 200402797	A	20040903	WO 2002US38509	A	20021203	200515
			NO 20042797	A	20040702	

Priority Applications (No Type Date): US 2001337009 P 20011203; US  
 2002308516 A 20021203

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200348525 A1 E 30 E21B-049/00

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA  
 CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN  
 IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ  
 OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU  
 ZA ZM ZW

Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB  
 GH GM GR IE IT KE LS LU MCMW MZ NL OA PT SD SE SI SK SL SZ TR TZ UG ZM  
 ZW

US 20030127230 A1 E21B-033/76 Provisional application US 2001337009

AU 2002353012	A1	E21B-049/00	Based on patent WO 200348525
BR 200214600	A	E21B-049/00	Based on patent WO 200348525
GB 2400871	A	E21B-049/00	Based on patent WO 200348525
US 6823950	B2	E21B-007/12	Provisional application US 2001337009
NO 200402797	A	E21B-049/00	

Abstract (Basic): WO 200348525 A1

NOVELTY - Pressures during **subsea** well drilling operations in an earth formation are controlled by providing a weighted drilling fluid system that pumps fluid in the formation to provide **hydrostatic** pressure; performing first and second leak off tests; and performing drilling operations while **maintaining** pressure exerted by the drilling fluid between reopen and propagation pressure.

DETAILED DESCRIPTION - Controlling of pressures during **subsea** well drilling operations in an earth formation involves:

(1) providing a weighted drilling fluid system in which fluid is pumped through a drilling string in the earth formation to provide a **hydrostatic** pressure, and return to up an annulus between a borehole created by the drilling string and a drilling riser, such that the drilling fluid is returned to atmospheric pressure, **cleaned**, measured, and reused;

(2) performing a first leak off test by increasing pump pressure to determine a fracture opening pressure (FOP), unstable fracture propagation pressure (UGP), fracture propagation pressure (FPP), or a fracture closure pressure for the earth formation (FCP);

(3) performing a second leak off test by increasing pump pressure to determine a fracture reopen pressure; and

(4) performing drilling operations while **maintaining** pressure exerted by the drilling fluid on the earth formation between fracture reopen pressure and fracture propagation pressure.

USE - Used for controlling pressure during **subsea** well drilling operations in an earth formation.

ADVANTAGE - The process overcomes formation breathing occurring during the drilling of the **subsea** well while **maintaining** the **hydrostatic** pressure on the earth formation between the fracture re-open pressure and the fracture propagation pressure. Specifically, it permits drilling and well control operations to take place within the pressure range that will minimize damage to the formation while addressing problems associated with fracture breathing.

DESCRIPTION OF DRAWING(S) - The figure is a graph showing the reaction of an earth formation in a drilling environment.

pp; 30 DwgNo 1/3

#### Technology Focus:

TECHNOLOGY FOCUS - MECHANICAL ENGINEERING - Preferred Condition: The fracture propagation pressure is a maximum pressure under which the earth formation will continue fracture propagation in response to **increased pressure**, and the fracture re-open pressure is a pressure under which existing earth formation fracture will re-open in response to the pressure.

Preferred Process: The pressure exerted by the drilling fluid on the earth formation is **maintained** by monitoring the pressure in the annulus; measuring drilling fluid volume; providing a choke and kill system, including choke, kill **lines** and **manifolds**, and during drilling operations and **maintaining** pressure applied on the earth formation such that FCP and FPP are defined by equations (1-4); and determining an equivalent circulating density (ECD) of the fluid, such that FCP and FPP may be defined by equations (5, 6).

$DCHOKE \times \rho_{CHOKE} + (DTVD + DAIR - DCHOKE) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY}$  more than FCP (1)

$DCHOKE \times \rho_{CHOKE} + (DTVD + DAIR - DCHOKE) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY}$  less than FPP (2)

$PCHOKE + (DTVD + DAIR) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY}$  more than FCP (3)

$PCHOKE + (DTVD + DAIR) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY}$  less than FPP (4)

$ECD = (DTVD + DAIR) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY} + \Delta P_{FRICTION}$  more than FCP (5)

$ECD = (DTVD + DAIR) \times \rho_{FLUID} + \Delta P_{COMPRESSIBILITY} + \Delta P_{FRICTION}$  less than FPP (6)

DCHOKE=length of the choke **line** filled with a weighted fluid;  
 $\rho_{CHOKE}$ =density gradient of the weighted fluid in the choke **line**

;

DTVD=true vertical depth of the wall;

DAIR=distance between sea level and a rig floor supporting drilling operations;  
rhoFLUID=drilling fluid density in the well;  
DELTAPCOMPRESSIBILITY=downhole **pressure increase** attributable due to drilling fluid compressibility;  
DELTAPCHOKE=pressure applied to the choke **line** ; and  
DELTAPFRICTION=frictional pressure losses due to drilling fluid circulation  
Title Terms: CONTROL; PRESSURE; **SUBSEA** ; WELL; DRILL; OPERATE; EARTH; FORMATION; COMPRISE; PUMP; DRILL; FLUID; FORMATION; **HYDROSTATIC** ; PRESSURE; **MAINTAIN** ; FRACTURE; OPEN; PROPAGATE; PRESSURE  
Derwent Class: H01; Q49  
International Patent Class (Main): E21B-007/12; E21B-033/76; E21B-049/00  
International Patent Class (Additional): E21B-021/06; E21B-021/08; E21B-021/088; E21B-043/26; E21B-043/266; E21B-047/06  
File Segment: CPI; EngPI  
Manual Codes (CPI/A-N): H01-C03

43/9/3 (Item 1 from file: 350)  
 DIALOG(R) File 350:Derwent WPIX  
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013607620 \*\*Image available\*\*  
 WPI Acc No: 2001-091828/200110  
 XRAM Acc No: C01-027166  
 XRPX Acc No: N01-069544

**Gas lift umbilical cable for use in deep water subsea oil field operations, comprises a flexible pipe having a collapse-resistant wall, and flexible gas lift hoses**

Patent Assignee: KELLOGG BROWN & ROOT INC (PULL )

Inventor: DAVIS A W; FRASER D J

Number of Countries: 092 Number of Patents: 006

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200102693	A1	20010111	WO 2000US18129	A	20000630	200110 B
AU 200059051	A	20010122	AU 200059051	A	20000630	200125
US 6283206	B1	20010904	US 99347586	A	19990701	200154
NO 200106415	A	20020228	WO 2000US18129	A	20000630	200223
			NO 20016415	A	20011228	
EP 1200703	A1	20020502	EP 2000945056	A	20000630	200236
			WO 2000US18129	A	20000630	
BR 200012147	A	20020611	BR 200012147	A	20000630	200248
			WO 2000US18129	A	20000630	

Priority Applications (No Type Date): US 99347586 A 19990701

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200102693 A1 E 25 E21B-017/00

Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TZ UG ZW

AU 200059051 A E21B-017/00 Based on patent WO 200102693

US 6283206 B1 E21B-017/00

NO 200106415 A E21B-000/00

EP 1200703 A1 E E21B-017/00 Based on patent WO 200102693

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI

BR 200012147 A E21B-017/00 Based on patent WO 200102693

Abstract (Basic): WO 200102693 A1

NOVELTY - A gas lift umbilical (GLU) cable (10) comprises a flexible pipe having a collapse-resistant wall and a first sealing layer formed on the wall's interior surface which defines a longitudinal passage. Flexible gas lift hoses (16) are mounted within the longitudinal passage and extend from a first to a second end of the pipe.

DETAILED DESCRIPTION - A gas lift umbilical (GLU) cable comprises a flexible pipe having a collapse-resistant wall and a first sealing layer formed on an interior surface of the wall which defines a longitudinal passage; and a core within the flexible pipe. The core includes a protective sheath that encases flexible gas lift hoses, shape-conforming standard fillers, wire rope fillers, and air hoses. The gas lift hoses within the longitudinal passage extend from a first end of the pipe to a second end. At least a portion of the hydraulic hoses is collapse resistant to **hydrostatic** pressure. Preferred Features: The umbilical further comprises a subsea (102) and a topside

termination assembly; and a first and a second adapter joining a first and a **second end** of **each** hose to the **subsea** and topside termination assemblies, respectively.

USE - For use in deep water subsea oil field operations.

ADVANTAGE - The gas lift hoses of the inventive GLU cable can be constructed of standard hydraulic hoses which are less expensive than specialized hoses and which enable the use of standard hose fittings. The flexible pipe provides high **hydrostatic** pressure collapse resistance. The inner gas lift annulus will be sealed from seawater such that the inner components of the GLU cable are protected against corrosion and **hydrostatic** pressure.

DESCRIPTION OF DRAWING(S) - The figure is a fragmentary side view illustrating the inventive subsea termination assembly.

Gas lift umbilical (10)

Gas lift hoses (16)

Subsea termination assembly (102)

pp; 25 DwgNo 6/8

#### Technology Focus:

TECHNOLOGY FOCUS - MECHANICAL ENGINEERING - Preferred Components: The standard filler is adjacent each gas lift hose, and is conformably engaged between the pipe and the respective hose. The wire rope fillers extend between the first and second end of the pipe, and are attached adjacent the first end to the subsea end of the pipe. The air hoses within the longitudinal passage also extend from the first to the second end of the pipe. The air hoses have a length different from the other air hoses, and each is connected to a port in the topside termination assembly. The pipe further comprises a second sealing layer formed adjacent an exterior surface of the collapse-resistant wall. The subsea and topside termination assemblies are attached to the collapse-resistant wall. The collapse-resistant wall includes a tensile-bearing layer which has helically formed wires and which is attached to the subsea termination assembly. The wires are helically wound along the pipe.

INORGANIC CHEMISTRY - Preferred Layer: The tensile-bearing layer is a helically wound layer of metallic strip material.

Title Terms: GAS; LIFT; UMBILICAL; CABLE; DEEP; WATER; SUBSEA; OIL; FIELD; OPERATE; COMPRISE; FLEXIBLE; PIPE; COLLAPSE; RESISTANCE; WALL; FLEXIBLE; GAS; LIFT; HOSE

Derwent Class: H01; Q49; Q67

International Patent Class (Main): E21B-000/00; E21B-017/00

International Patent Class (Additional): F16L-011/00; F16L-011/20; F16L-011/22

File Segment: CPI; EngPI

Manual Codes (CPI/A-N): H01-D02; H01-D06C

10/716248

24jun05 09:54:25 User276834 Session D66.1

File 96:FLUIDEX 1972-2005/Jun

Set Items Description

S1 18420 UNDERWATER? OR UNDER(2N)WATER? OR UNDERSEA? OR SEAFLOOR? OR  
SEA(2N)FLOOR? OR SEA(2N)BOTTOM??? OR SUBMERG???? OR SUBMERSIBL??? OR OCEANFLOOR?? OR  
OCEAN(2N)FLOOR?? OR OCEAN(2N)BOTTOM??? OR SUBSEA OR SUB()SEA OR SEABED OR SEA(2N)BED OR  
MARINE

S2 42044 CLEAN???? OR DEWATER???? OR DRY???? OR PIG???? OR INSPECT??? OR  
MAINT??????? OR EXPURGAT??? OR PURG???? OR PURIF???????

S3 6092 HYDRO(2N)TEST???? OR HYDROTEST???? OR HYDROSTATIC OR HYDRO(2N)STATIC? OR  
WATERTEST??? OR WATER(2N)TEST???? OR LEAK????(3N)RESIST???? OR PRESSURE(3N)LEAK???? OR  
PRESSURE(3N)FLAW??

S4 125344 PIPELIN???? OR PIPE(3N)LINE OR PIPE? ? OR VESSEL? ? OR AQUEDUCT? ? OR  
CANAL??? OR CHANNEL???? OR CONDUIT OR FLUID(3N)PASSAG???? OR MAIN? ? OR DUCT? ? OR TUBE??  
OR PASSAG??? OR LINE? ? OR CHAMBER?? OR MANIFOLD??? OR PLATFORM??? OR OFFSHORE(2N) (TREES  
OR FACILITIES)

S5 868 PIG???? OR PIPELINE()INSPECT????() (GAUG???? OR GADGET? ?)  
S6 32569 PUMP???? OR SIPHON????

S7 944 SV? ? OR SUBSEA(2N)VEHICLE? ? OR ROV? ? OR REMOTE??()OPERAT???()VEHICLE??  
OR AUV? ? OR AUTONOMOUS()UNDERWATER()VEHICLE??

S8 94 (ROBOT?? OR MACHINE OR AI OR INTELLIGEN???? OR AUTOMATON OR COMPUTER????  
OR MECHANIC???) (3N) (ARM? ? OR LEVER??? OR LIMB?? OR APPENDAGE? ?)

S9 1827 (INTERNAL??? OR INNER OR CORE) (3N) (PRESSUR???? OR STRAIN???? OR STRESS???  
OR TENSION???)

S10 28 HYDROSTATIC????(5N)PIPELINE  
S11 39 SUBMERG????(3N)PIPELINE

S12 4976 (SECOND OR TWO OR BOTH OR TWIN OR 2 OR EACH OR 2ND OR DOUBLE) (3N) (END???  
OR POINT??? OR EDGE??? OR INLET? ? OR OUTLET? ? OR MANIFOLD? ?)

S13 2196 (RAIS???? OR INCREASE???? OR MAXIMIZ????) (3N) (PRESSURE)  
S14 20 PIG(3N) (LAUNCH???? OR RECEIV????)

S15 0 IC=(G01M-003/04 OR B63B-035/03 OR F16L-001/16 OR F16L-055/48 OR  
G01M003/18 OR G01M-019/00 OR G01M-003/08 OR B08B-001/00 OR F16L-001/04 OR F16L-045/00 OR  
F16L-055/00 OR G01C-007/06 OR B08B-009/00 OR B08B-009/04 OR G01H-003/00)

S16 0 MC=(S02-J06A OR S02-J06B OR S02-J06)  
S17 0 S1 AND S2 AND S3 AND S4 AND S7 AND S12  
S18 0 S1 AND S2 AND S3 AND S12  
S19 3 S1 AND S3 AND S12  
S20 4 S1 AND S7 AND S12  
S21 3 S20 NOT S19  
S22 47 S1 AND S2 AND S3  
S23 0 S22 AND S8  
S24 184 S1 AND S12  
S25 67 S1 AND S9  
S26 6 S25 AND S3  
S27 7 S1 AND S8  
S28 7 S7 AND S12  
S29 0 S10 AND S11 AND S12  
S30 47 S22 NOT (S19 AND S20)  
S31 5 S26 NOT (S19 OR S20 OR S22)  
S32 7 S27 NOT (S19 OR S20 OR S22 OR S26)  
S33 3 S28 NOT (S19 OR S20 OR S22 OR S26 OR S27)  
S34 61 S25 NOT (S19 OR S20 OR S22 OR S26 OR S27 OR S28)  
S35 0 S34 AND S3  
S36 1 S34 AND S7  
S37 1 S34 AND S12  
S38 32 S34 AND S4  
S39 1 S37 NOT S36

30/3,K/4

DIALOG(R)File 96:FLUIDEX

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00416731 FLUIDEX NO: 0486040

**Acoustic leak detection for underwater oil and gas pipelines**

AUTHOR(S): Barbagelata A.; Barbagelata L.

CORPORATE SOURCE: Co.L.Mar, La Spezia, Italy

Sea Technology, 43/11 (39-44), 2002

ISSN: 0093-3651

COUNTRY OF PUBLICATION: United States

DOCUMENT TYPE: Journal; Article

RECORD TYPE: ABSTRACT

LANGUAGES: English SUMMARY LANGUAGES: English

**Acoustic leak detection for underwater oil and gas pipelines**

...or gas pipeline is completed it has to go through a check known as a "**hydro - test**" prior to commissioning. The pipeline is sealed and filled with seawater, and the internal pressure...

...for the pipeline construction company, and, in general, clients will not accept pipelines until a **hydro - test** has been successfully completed. If **hydro - testing** determines that leaks are present, it is then important to locate the leaks as soon...

...is expensive- especially if one has barges, vessels and personnel offshore. Traditional techniques for leak **inspection** consist of filling the pipeline with a solution of water and a chemically or optically...

...L.Mar. was requested by a major oil company to research an alternative solution for **underwater** pipeline leak detection. In order to avoid the limits of the optical and chemical systems...

...by a system comprised of a hydrophone array, a preamplifier and a cable driver. The **underwater** unit may be used in a variety of ways, such as on a vessel-towed...

...in handheld mode by a diver. This last method of operation is particularly suited to **inspection** around flanges, valves, etc. The signal is brought onboard via cable where it is initially...

CLASSIFICATION CODE(S) AND DESCRIPTION: ... **MAINTENANCE** )

DIALOG(R) File 96:FLUIDEX  
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00416731 FLUIDEX NO: 0486040  
Acoustic leak detection **for** underwater oil and gas pipelines  
AUTHOR(S): Barbagelata A.; Barbagelata L.  
CORPORATE SOURCE: Co.L.Mar, La Spezia, Italy  
Sea Technology, 43/11 (39-44), 2002  
ISSN: 0093-3651  
COUNTRY OF PUBLICATION: United States  
DOCUMENT TYPE: Journal; Article  
RECORD TYPE: ABSTRACT  
LANGUAGES: English SUMMARY LANGUAGES: English

In the offshore industry, once a new oil or gas pipeline is completed it has to go through a check known as a "hydro-test" prior to commissioning. The pipeline is sealed and filled with seawater, and the internal pressure is raised up to a test value and then subsequently monitored. If pressure is observed to be decreasing, it indicates that the pipeline has a leak somewhere along its length. This can prove incredibly costly for the pipeline construction company, and, in general, clients will not accept pipelines until a hydro-test has been successfully completed. If hydro-testing determines that leaks are present, it is then important to locate the leaks as soon as possible in order to start repairs. Problems arise when trying to locate holes that can be only a few millimetres in diameter somewhere along possibly hundreds of kilometres of pipeline. This is particularly difficult if, as is often the case, the pipeline is either partially or totally buried in sediment. Work of this nature may take a long time, and time is expensive- especially if one has barges, vessels and personnel offshore. Traditional techniques for leak inspection consist of filling the pipeline with a solution of water and a chemically or optically detectable compound. The pipeline is then followed by an ROV equipped with either a dedicated sensor or a video camera, as appropriate. During numerous offshore surveys (in which our equipment was often used in parallel with these conventional techniques), we observed a number of limitations with traditional leak detection systems. The efficiency of these systems is a function of the concentration of the detectable component in the seawater in the area of a leak. Even in the case of a large leak, this concentration can be dramatically reduced by ambient conditions such as current flow, pipeline burial or water visibility. Furthermore, in the case of very small leaks, the flow rate is often too low to reach the threshold concentration of the systems, even when used in suitable ambient conditions. Several years ago, Co.L.Mar. was requested by a major oil company to research an alternative solution for underwater pipeline leak detection. In order to avoid the limits of the optical and chemical systems, an acoustic solution was investigated. Acoustic propagation is not dependent on current or turbidity, and the acoustic signal generated by a leak can be very strong, even if the source is a leak of relatively small dimensions. Acoustic signals generated by pipeline leaks are detected by a system comprised of a hydrophone array, a preamplifier and a cable driver. The underwater unit may be used in a variety of ways, such as on a vessel-towed fish, an ROV installation or in handheld mode by a diver. This last method of operation is particularly suited to inspection around flanges, valves, etc. The signal is brought onboard via cable where it is initially preconditioned prior to acquisition by a PC. Data is immediately processed, displayed and digitally recorded. The software visualises in various ways the results of the analysis of the signal along the track, allowing evaluation in real time of the evolution of the acoustic content and, therefore, the rising of components related to the leakage presence.

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DIALOG(R)File 96:FLUIDEX

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00222491 FLUIDEX NO: 0230460 SUBFILE: FE

**New methods detect subsea flow line leaks.**

AUTHOR(S): Bryngelson R.H.

Pet. Engr. Int., vol.59, no.4, Apr. 1987, p.35-38., 1987

DOCUMENT AVAILABLE: YES

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DESCRIPTORS: LEAK DETECTION PIPES  
CLASSIFICATION CODE(S) AND DESCRIPTION: 79.6.9.1

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FILE 'OCEAN' ENTERED AT 13:40:18 ON 24 JUN 2005

L1 116715 S UNDERWATER# OR UNDER(2N)WATER# OR UNDERSEA# OR SEAFLOOR# OR  
L2 25183 S CLEAN### OR DEWATER#### OR DRY#### OR PIG#### OR INSPECT### O  
L3 1669 S HYDRO(2N)TEST#### OR HYDROTEST#### OR HYDROSTATIC OR HYDRO(2N  
L4 58124 S PIPELIN#### OR PIPE(3N)LINE OR PIPE# OR VESSEL OR AQUEDUCT OR  
L5 2591 S PIG#### OR PIPELINE(W)INSPECT####(W)(GAUG#### OR GADGET)  
L6 2987 S PUMP#### OR SIPHON####  
L7 1804 S SV OR SUBSEA(2N)VEHICLE OR ROV OR REMOTE##()OPERAT###()VEHICL  
L8 16 S (ROBOT## OR MACHINE OR AI OR INTELLIGEN#### OR AUTOMATON OR C  
L9 264 S (INTERNAL### OR INNER OR CORE)(3N)(PRESSUR#### OR STRAIN####  
L10 6 S HYDROSTATIC####(5N)PIPELINE  
L11 20 S SUBMERG####(3N)PIPELINE  
L12 1940 S (SECOND OR TWO OR BOTH OR TWIN OR 2 OR EACH OR 2ND OR DOUBLE)  
L13 473 S (RAIS#### OR INCREASE#### OR MAXIMIZ####)(3N)(PRESSURE)  
L14 5 S PIG(3N)(LAUNCH#### OR RECEIV#### )  
L15 55 S L1 AND L2 AND L3  
L16 1 S L15 AND L12  
L17 619 S L1 AND L12  
L18 7 S L17 AND L7  
L19 0 S L10 AND L11 AND L12  
L20 2 S L15 AND L5